

[0021] It is preferable to provide a device for preventing the syringe or the plunger of the syringe from dropping off. For example, the size of the cylinder storage groove is determined to be smaller than that of the flange of the syringe, so that the cylinder of the syringe is prevented from moving and dropping off in the axial direction. The plunger storage groove is closed at one end surface so that the plunger of the syringe is prevented from coming off and dropping off from the cylinder.

[0022] Preferably, the storage groove prevents the axial rotation of the syringe. It is because the syringe is stabilized, and the position of indication formed on the syringe is also kept constant.

[0023] The invention may also be understood as a syringe set combining the syringe holder and the syringe stored in the syringe holder.

[0024] According to the invention, the plurality of syringes can be stored in the syringe holder. Therefore, when the syringe holder is stored in the sterilized package, the syringes are prevented from being scattered in the sterilized package, and hence can be treated as a single unit. Therefore, handling in use or selection of a syringe is facilitated. Therefore, the manipulation can be facilitated, and the manipulation time can be reduced.

[0025] When the allowance is provided in the storage groove of the syringe holder, since a clearance is defined between the syringe holder and the syringe, sterilization by gas such as ethylene oxide gas can easily be achieved. In addition, by reducing the contact area between the syringe and the syringe holder by the protrusion, the clearance between the syringe and the syringe holder can be sterilized further reliably.

#### BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0026] These and other features, aspects, and advantages of the apparatus and methods of the present invention will become better understood with regard to the following description, appended claims, and accompanying drawings where:

[0027] FIG. 1 is a top view of a syringe set according to an embodiment of the invention;

[0028] FIG. 2 is a drawing viewed in the direction indicated by an arrow A in FIG. 1;

[0029] FIG. 3 is a drawing showing a structure of a syringe;

[0030] FIG. 4 is a cross-section of FIG. 1 showing a case in which the syringes are not mounted;

[0031] FIG. 5 is a cross-section of FIG. 1 showing a case in which the syringes are not mounted.

[0032] FIG. 6 is a cross-sectional view showing an example of a balloon catheter;

[0033] FIG. 7 is a cross-sectional view showing the distal portion of the balloon catheter;

[0034] FIG. 8 is a top view of a syringe holder;

[0035] FIG. 9 is a cross-section of FIG. 8;

[0036] FIG. 10 is a cross-section of FIG. 8;

[0037] FIG. 11 is a drawing showing a cylinder storage groove;

[0038] FIG. 12 is a drawing showing the cylinder storage groove;

[0039] FIG. 13 is a top view of the syringe set; and

[0040] FIG. 14 is a cross-section of FIG. 13.

#### DETAILED DESCRIPTION OF THE DRAWINGS

[0041] Preferred embodiments of the invention will be described below with reference to the accompanying drawings.

[0042] FIG. 1 and FIG. 2 show a syringe set 1 having three syringes 2, 3 and 4 with different capacities stored in a syringe holder 5.

[0043] The syringes 2, 3 and 4 are shown in FIG. 3A to FIG. 3C. As shown in FIG. 3C, the syringe 2 includes a cylinder 6 as an outer cylindrical member and a plunger (push rod) 7 to be slidably inserted into the cylinder 6.

[0044] The cylinder 6 includes a distal portion 6a having smaller diameter at the distal end thereof, and a connecting portion 8 extends therefrom along the axial line. The connecting portion 8 is formed with an outlet port 9 for communicating the interior of the cylinder 6 with the outside along the axial line thereof. The outlet port 9 is for introducing air to a balloon catheter, described later. The connecting portion 8 is also provided with a cylindrical portion 10 so as to cover the outlet port 9, and the cylindrical portion 10 is formed with an inner thread 10a. A proximal portion 6b of the cylinder 6 is formed with an insertion port 11a so as to allow the plunger 7 to be inserted therein. The proximal portion 6b of the cylinder 6 is formed also with a flange 12a extended in the direction substantially orthogonal to the axial line of the cylinder 6 and in the radial direction of the cylinder 6. The cylinder 6 has a substantially uniform inner diameter to the insertion port 11a at the proximal portion 6b except for the distal portion 6a with reduced diameter. The inner peripheral surface near the insertion port 11a is formed with a projection (not shown) for preventing the plunger 7 from coming off.

[0045] The cylinder 6 is formed with a scale 13a on the outer peripheral surface along the axial line thereof. The scale 13a shows a capacity of a space formed in the cylinder with reference to the side of the distal portion 6a. However, the scale is not limited thereto, and may be that indicating the outer diameter of the expended balloon when a seal member 19a, described later, is moved from the position on the scale to the distal end.

[0046] The cylinder 6 is formed with a hole 14 so as to align with the scale 13a. The hole 14 communicates between the inside and the outside of the cylinder 6, and is formed at a position where a predetermined capacity (first capacity) is defined in the cylinder 6. The first capacity corresponds, for example, to the amount of air which expands the balloon to 8.5 mm in diameter.

[0047] The cylinder 6 is also formed with a hole 15 at a position shifted from the hole 14 by about ¼ turn in the circumferential direction (about 90° in angle). The hole 15 communicates between the inside and the outside of the cylinder 6, and has substantially the same size as the hole 14.

[0048] The plunger 7 has a main body 18a formed by two plate strips 17a intersected into a cross-shape. The main body 18a has a size which can be inserted into the cylinder 6, and is attached with the seal member 19a at the distal end thereof. The seal member 19a has a sealing surface 20a which is kept in sliding contact with the inner peripheral surface of the cylinder 6, so as to establish air-tightness between the inner peripheral surface of the cylinder 6 and the seal member 19a. The main body 18a is provided with a disk-shaped pressing portion 21 at the proximal end thereof.